

CLAIMS

What is claimed is:

1. A communications satellite comprising:  
  
a plurality of available downlink antenna apertures, each downlink antenna aperture transmitting a plurality of downlink feed signals;  
  
a plurality of switching devices to selectively switch a plurality of input signals and provide a plurality of switched signals; and  
  
a plurality of high power amplifiers (HPAs), each one of said plurality of switched signals being received and driven by one of said plurality of HPAs into a corresponding one of said plurality of switching devices and downlink feed signals, wherein said plurality of HPAs are organized into multiple HPA redundancy pools, each one of the multiple HPA redundancy pools providing downlink feed signals to a respectively unique combination of said plurality of downlink antenna apertures.
2. The satellite of claim 1, wherein each one of said multiple HPA redundancy pools provides downlink feed signals to the same number of downlink antenna apertures as the other ones of said multiple HPA redundancy pools.
3. The satellite of claim 2, wherein said same number of downlink antenna apertures is between 2 and  $N-1$ , where  $N$  is the number of available downlink antenna apertures, greater than or equal to 3.

4. The satellite of claim 2, wherein each one of said HPA redundancy pools is located so that the waveguide run length between it and the furthest downlink antenna aperture of its unique combination of downlink antenna apertures is minimized.

5. The satellite of claim 1, further comprising a plurality of uplink antenna apertures to receive a plurality of uplink beams.

6. The satellite of claim 5, wherein each of said plurality of uplink beams from corresponding ones of said uplink antenna apertures are provided as said input signals to said plurality of switching devices.

7. The satellite of claim 1, wherein said signals relate to broadband communications.

8. The satellite of claim 1, further comprising a control unit to control operation of at least said plurality of switching devices such that each input signal is routed to a desired downlink antenna aperture.

9. The satellite of claim 1, wherein the event that one of the HPAs in a HPA redundancy pool fails, one of the other HPAs in said HPA redundancy pool drives the downlink feed signal of said one of the HPAs.